

# PATENT ABSTRACTS OF JAPAN

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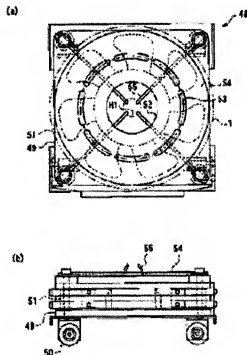
(54) COOLING METHOD FOR DISK SUBSTRATE, DISK SUBSTRATE COOLING UNIT, DISK SUBSTRATE COOLING APPARATUS, DISK MANUFACTURING METHOD AND DISK MANUFACTURING APPARATUS

(57)Abstract:

**PROBLEM TO BE SOLVED:** To provide an in-line type disk manufacturing method cooling a disk substrate immediately after molding by a disk substrate molding machine in a shorter time to manufacture the disk substrate having excellent flatness and shape stability and having a high yield for manufacturing a laminated disk (DVD).

**SOLUTION:** In cooling the disk substrate made of plastics immediately after molding, the disk substrate is placed on the surface of a holding member 54, which has a flat surface and has through-holes 52 and 53 piercing therethrough from the upper surface to the rear surface thereof, at a position covering a part of the through-holes 52 and 53 and air is sucked from the rear

surface of the holding member 54 to generate air streams flowing from the upper surface side of the holding member 54 to the rear surface side thereof to accelerate the cooling of the disk substrate while keeping the disk substrate flat on the surface of the holding member.



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**CLAIMS**

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**[Claim(s)]**

[Claim 1]Are the method of cooling a plastic disk substrate immediately after molding, and the surface is planate, Where said disc substrate is carried on the surface of an attachment component which has a breakthrough penetrated at the rear face from this surface, A cooling method of a disc substrate cooling carrying out flat-surface maintenance of said disc substrate on the surface of said attachment component by performing inhalation of air from the rear-face side of said attachment component, and generating an air current which flows into the rear-face side from the surface side of this attachment component.

[Claim 2]A cooling method of the disc substrate according to claim 1 characterized by generating said air current in both inner periphery edges and outer periphery parts of a disc substrate at least.

[Claim 3]Claim 1 characterized by removing said disc substrate from on said attachment component at the 2nd point after making said disc substrate hold on the surface of said attachment component at the 1st point and moving this attachment component by a moving road, or a cooling method of a disc substrate given in either of 2.

[Claim 4]A cooling method of the disc substrate according to claim 3 which moves again said attachment component which had said disc substrate removed at the 2nd point to the 1st point, carries another disc substrate, and carries out repeated use.

[Claim 5]A cooling method of a disc substrate of Claim 4 with which said two or more attachment components are installed in a moving road so that 1 directional movement is possible.

[Claim 6]While forming this attachment component and a fan of an electromotive type in one in the rear-face side of said attachment component, A cooling method of the disc substrate according to any one of claims 3 to 5 generating said air current by providing a contact electrode for supplying electric power to said fan in said moving road, and rotating said fan.

[Claim 7]A cooling method of the disc substrate according to claim 6 supplying direct current voltage to said fan intermittently in said moving road.

[Claim 8]A cooling method of the disc substrate according to claim 7 which moves said attachment component in said moving road intermittently, and is characterized by supplying direct current voltage to said fan at the time of a stop of said attachment component.

[Claim 9]By filling up a metallic mold with a plastic which is a manufacturing method manufactured continuously and fused a lamination disk, A disc substrate molding process of molding said disc substrate of two sheets which should be pasted together, A cooling process which cools a disc substrate of two sheets immediately after said molding using said cooling method according to any one of claims 1 to 8, A disk manufacturing method having a weld slag process of forming a visible light reflecting layer in at least one disc substrate, and a lamination process which pastes said disc substrate of two sheets together via adhesives, and is used as a disk of one sheet among said disc substrates of two sheets.

[Claim 10]The disk manufacturing method according to claim 9, wherein said disk is DVD.

[Claim 11]Where it had an attachment component which has a breakthrough which the surface is planate and penetrates at the rear face from this surface, and a suction means provided in the rear-face side of said attachment component and a disc substrate is carried on the surface of said attachment component, A disc substrate refrigeration unit characterized by cooling said disc substrate while inhaling by said suction means and holding a disc substrate immediately after said shaping on the surface of said attachment component.

[Claim 12]While having the 1st larger breakthrough than a feed hole of said disc substrate on the surface, said attachment component, When said disc substrate is carried on said attachment component so that said 1st breakthrough and a center may be in agreement, The disc substrate refrigeration unit according to claim 11 characterized by a thing of whether at least a part of periphery edge of said disc substrate is located in a method of outside [ edge / of said attachment component ], or a breakthrough is provided in a position which laps with a periphery edge of this disc substrate for which it has one of shape at least.

[Claim 13]A path of said 1st breakthrough is larger than 15 mm, a center is the same as said 1st breakthrough, and the 2nd breakthrough is provided on a circle whose path is 80 mm, And, [ whether the edge of said attachment component is located in an inner direction from a circle whose path a center is the same as said 1st breakthrough, and is 120 mm, and ] Or the disc substrate refrigeration unit according to claim 12 characterized by a thing of whether the 3rd breakthrough is provided on a circle in which said path is 120 mm for which it has one of shape at least.

[Claim 14]A moving path characterized by comprising the following where the disc substrate refrigeration unit according to any one of claims 11 to 13 moves, and the 1st point of said moving road.

A means to carry said disc substrate on the surface of said attachment component of said disc substrate refrigeration unit.

A means which removes said disc substrate from said attachment component of said disc substrate refrigeration unit at the 2nd point of said moving road.

[Claim 15]The KU substrate cooling device according to claim 14 in which said moving path is making a circuit, moves a disc substrate refrigeration unit by which said disc substrate was removed at the 2nd point to the 1st point, and carries and carries out repeated use of another disk DISU board.

[Claim 16]The disc substrate cooling system according to claim 15 with which said disk refrigeration unit more than plurality is installed in said moving road so that 1 directional movement is possible.

[Claim 17]The disc substrate cooling system according to any one of claims 14 to 16, wherein a contact electrode for an electromotive fan being formed in one with said attachment component as said suction means, and supplying electric power to said fan at said moving road is provided.

[Claim 18]A manufacturing installation which produces a lamination disk continuously, comprising:

A disc substrate molding means to fill up a metallic mold with a fused plastic and to mold said disc substrate of two sheets which should be pasted together.

A cooling method which cools a disc substrate of two sheets immediately after said molding using said cooling system according to any one of claims 14 to 17.

Visible light reflection film means forming which forms a visible light reflecting layer in at least one disc substrate among said two-sheet disc substrates.

A lamination means which pastes said disc substrate of two sheets together via adhesives, and is used as a disk of one sheet.

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[Translation done.]

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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]Especially this invention relates to the suitable lamination method for manufacture of the digital video / versatile disk (it is hereafter written as DVD) which takes a lamination method about lamination \*\*\*\*\* in two members, for example, a disk.

[0002]

[Description of the Prior Art]In DVD which is an information light disk, it is manufactured through the molding process of a disc substrate, the weld slag process of forming a visible light reflection film, a lamination process, etc. Said molding process is for while becoming the Information Storage Division layer of a disc substrate, and making a field transfer the detailed pit (hole) and groove (slot) of La Stampa which filled up the metallic mold with the fused plastic in an instant, and were beforehand set to the metallic mold with sufficient accuracy. Optical uniformity, such as submicron transfer nature and a double reflex, mechanical surface smoothness, etc. are raised to the accuracy for which the molded disc substrate is asked. When completing molding, maintaining such performances and transmitting promptly after a next process realizes an efficient manufacturing process, it is indispensable.

[0003]On the other hand, in said molding process, since the plastic (generally polycarbonate) by which heat melting was carried out to hundreds of times is used, by the disc substrate soon after after molding, the shape of a dovetail shape does not become settled easily in a high temperature state with the remarkable surface. It is also known that the disc substrate immediately after molding will cause vertical motion by the cooling process. In the disc substrate in which cooling was completed through such substrate movement, and shape became settled, instability remained in the surface smoothness. As for the disc substrate used for DVD, since thickness had only a half compared with 0.6 mm and the conventional CD, especially the tendency became strong. In the case where the shape of a disc substrate is not

flat, information reliability may have been spoiled, after pasting such two disc substrates together.

[0004]In order to make it cool gradually, spending further again the grade time which is room temperature environment in order to keep distortion from remaining by said cooling process, between the weld slag processes which are next processes, the cooling process which has a buffer of prescribed capacity needed to be established.

[0005]On the other hand, from disc substrate molding to lamination disk completion can be carried out stably, and the demand about realization of an in-line device smaller than that of an installation face product is increasing in recent years.

[0006]

[Problem(s) to be Solved by the Invention]This invention is made in view of the above-mentioned situation, and is a thing.

the purpose cools more the disc substrate immediately after molding by a briquetting machine to the inside of a short time, and it is excellent in surface smoothness -- shape -- it is providing the high inline-type disk manufacturing method of the yield for manufacturing a lamination disk (DVD) by considering it as a stable thing.

[0007]

[Means for Solving the Problem]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 1, Are the method of cooling a plastic disk substrate immediately after molding, and the surface is planate, Where said disc substrate is carried on the surface of an attachment component which has a breakthrough penetrated at the rear face from this surface, A cooling method of a disc substrate cooling carrying out flat-surface maintenance of said disc substrate on the surface of said attachment component is provided by performing inhalation of air from the rear-face side of said attachment component, and generating an air current which flows into the rear-face side from the surface side of this attachment component. Generally, if skin temperature of a disc substrate immediately after molding is measured against a room temperature, shape will not become settled quite highly, either. Then, after laying said disc substrate in said attachment component, power in which the whole disc substrate surface is suppressed soft without contact by the side of the surface uniform moreover from the surface to said attachment component by making an air current which flows into a rear face act is used. Flat-surface maintenance is attained by it, and a flow of an air current also brings about a moderate cooling facilitatory effect. A flat thing of a mounting surface of said attachment component is desirable in accuracy according to the purpose, and, as for speed of an air current made to act, it is preferred to be suitably adjusted according to the rigidity of said disc substrate.

[0008]In order to solve an aforementioned problem, in an invention concerning this invention

Claim 2, a cooling method of the disc substrate according to claim 1 generating said air current is provided in both inner periphery edges and outer periphery parts of a disc substrate at least. Said air current is making it generate over a whole inner periphery edge and an outer periphery part of a disc substrate, respectively rather than making it act on an inner periphery edge of a disc substrate, or a part of outer periphery part locally, There is no bias over the whole disc substrate surface, and it is made more desirable [ to generate uniformly power which forces a disc substrate on an attachment component ].

[0009]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 3, Said disc substrate is made to hold on the surface of said attachment component at the 1st point, After moving this attachment component by a moving road and performing shape stabilization by cooling in the meantime, Claim 1 removing said disc substrate from on said attachment component at the 2nd point or either of 2 is provided with a cooling method of a disc substrate of a description. Thus, if it has composition which removes said disc substrate from on said attachment component at the 2nd point after making said disc substrate hold on the surface of said attachment component at the 1st point and moving this attachment component by a moving road, it can apply to a continuous process and can contribute to improvement in productivity. Since only predetermined time can hold a disc substrate planate if only predetermined length moves an attachment component at a predetermined speed, it becomes possible to attain automation of a process.

[0010]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 4, Said attachment component which had said disc substrate removed at the 2nd point of said cooling method is again moved to the 1st point, and a cooling method of the disc substrate according to claim 3 which carries and carries out repeated use of another disc substrate is provided. Thus, by carrying out repeated use of the attachment component, it becomes possible to cool many disc substrates continuously one by one, and it can link directly with a molding process in a disk manufacturing method, and can use. In an invention concerning this invention Claim 5 for solving an aforementioned problem, said two or more attachment components provide a moving road with a cooling method of the disc substrate according to claim 4 currently installed so that 1 directional movement is possible. Disk number of sheets per time which can be processed can be made to increase by installing two or more above attachment components in a moving path.

[0011]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 6, While forming this attachment component and a fan of an electromotive type in one in the rear-face side of said attachment component, A contact electrode for supplying electric power to said fan is provided in said moving road, and a cooling method of the disc substrate according to claim 4 generating said air current is provided by rotating said fan. According to this method, also while moving a moving road, holding power of a board-shaped object object

in an attachment component can be kept stable. Although it is difficult to perform wiring for supplying electric power to a fan which moves a moving road with an attachment component, if a contact electrode is provided in a moving road, electric power can be easily supplied to a fan under movement.

[0012]In order to solve an aforementioned problem, in an invention concerning this invention Claim 7, a cooling method of the disc substrate according to claim 6 supplying direct current voltage to said fan intermittently in said moving road is provided. In a moving road, when supplying electric power to a fan via a contact electrode, it is preferred to supply direct current voltage intermittently. Since the direct current can operate on low voltage, electric power supplied to a fan has high safety. Since it will be easy to exhaust an electrode if an electric power supply using a contact electrode is performed, consumption of an electrode can be suppressed by supplying electric power intermittently. Although intermittently stopped by electric power supply to a fan, since it can continue being turned around a fan according to an inertia force also while an electric power supply has stopped, holding power of a board-shaped object and cooling in an attachment component are maintainable by setting up stop time of an electric power supply suitably. In order to solve an aforementioned problem, in an invention concerning this invention Claim 8, said attachment component in said moving road is moved intermittently, and a cooling method of the disc substrate according to claim 7 supplying direct current voltage to said fan is provided at the time of a stop of said attachment component. When supplying electric power to a fan intermittently, an attachment component in a moving road is moved intermittently, and it is preferred at the time of a stop of an attachment component to supply direct current voltage to a fan.

[0013]At the time of a stop of an attachment component, by supplying electric power to a fan via a contact electrode, In an invention concerning [ in order to solve an aforementioned problem which can suppress consumption of an electrode effectively ] this invention Claim 9, By filling up a metallic mold with a plastic which is a manufacturing method manufactured continuously and fused a lamination disk, A disc substrate molding process of molding said disc substrate of two sheets which should be pasted together, A cooling process which cools a disc substrate of two sheets immediately after said molding using said cooling method according to any one of claims 1 to 8, A disk manufacturing method having a weld slag process of forming a visible light reflecting layer in at least one disc substrate, and a lamination process which pastes said disc substrate of two sheets together via adhesives, and is used as a disk of one sheet among said disc substrates of two sheets is provided.

[0014]In order to solve an aforementioned problem, in an invention concerning this invention Claim 10, the disk manufacturing method according to claim 9, wherein said disk is DVD is provided. Although the state where there is neither a crack nor foreign matter adhesion in a disk surface is required very severely when manufacturing disks, such as DVD, Since damage



to a crack, foreign matter adhesion, etc. can be prevented from arising on the surface of a disc substrate if a disc substrate is forced on an attachment component by a wind pressure as mentioned above and it holds planate, a disk excellent in surface accuracy which can meet the above-mentioned demand can be manufactured.

[0015]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 11, Where it had an attachment component which has a breakthrough which the surface is planate and penetrates at the rear face from this surface, and a suction means provided in the rear-face side of said attachment component and a disc substrate is carried on the surface of said attachment component, While inhaling by said suction means and holding a disc substrate immediately after said shaping on the surface of said attachment component, a disc substrate refrigeration unit cooling said disc substrate is provided. According to this disc substrate refrigeration unit, an air current which flows into the rear-face side from the surface side of an attachment component can be generated by a suction means by performing inhalation of air from the rear-face side of an attachment component. Therefore, it is a wind pressure by this air current, and a thing which holds it as force a disc substrate on an attachment component and for which soft power is made to act and a disc substrate is held planate without contacting an object to the surface side of a disc substrate since things can be carried out is possible. Therefore, a disc substrate can be held planate correctly, without doing damage to a crack, foreign matter adhesion, etc. to the surface.

[0016]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 12, While having the 1st larger breakthrough than a feed hole of said disc substrate on the surface, said attachment component, When said disc substrate is carried on said attachment component so that said 1st breakthrough and a center may be in agreement, . [ whether at least a part of periphery edge of said disc substrate is located in a method of outside / edge / of said attachment component / , and ] Or the disc substrate refrigeration unit according to claim 11 characterized by a thing of whether a breakthrough is provided in a position which laps with a periphery edge of this disc substrate for which it has one of shape at least is provided.

[0017]When according to the cooling system of this composition the center of a disc substrate arranges so that it may be in agreement with the center of the 1st breakthrough of the above, Since a wind pressure can be made to be able to act on both inner periphery edges and outer periphery parts of a disc substrate, a disc substrate can set radially power which forces a disc substrate on the surface of an attachment component and it can equalize more, it is desirable when preventing bending and curvature from arising in a disc substrate. A flow of an air current from the disk rear-face side to the surface side can be made good over both an inner periphery edge and an outer periphery part by specifying relation between a feed hole of a disc substrate, or a periphery edge and a breakthrough, or physical relationship of the edge of a

disk and an attachment component as mentioned above.

[0018]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 13, A path of said 1st breakthrough is larger than 15 mm, a center is the same as said 1st breakthrough, and the 2nd breakthrough is provided on a circle whose path is 80 mm, And. [ whether the edge of said attachment component is located in an inner direction from a circle whose path a center is the same as said 1st breakthrough, and is 120 mm, and ] Or the disc substrate refrigeration unit according to claim 12 characterized by a thing of whether the 3rd breakthrough is provided on a circle in which said path is 120 mm for which it has one of shape at least is provided.

[0019]Are applicable to both an outer diameter [ of 80 mm ] type disc substrate, and an outer diameter [ of 120 mm ] type disc substrate, and even if a tabular member is which disc substrate, a wind pressure can be made to act on both the inner periphery edge and outer periphery part, if it is considered as a cooling system of this composition.

[0020]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 14, In a moving path where the disc substrate refrigeration unit according to any one of claims 11 to 13 moves, and the 1st point of said moving road, In a means to carry said disc substrate on the surface of said attachment component of said disc substrate refrigeration unit, and the 2nd point of said moving road, A disc substrate cooling system provided with a means which removes said disc substrate from said attachment component of said disc substrate refrigeration unit is provided.

[0021]By considering it as a cooling system of this composition, it can apply to a continuous process and can contribute to improvement in productivity. It is also possible to attain automation of a process. In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 15, Said moving path is making a circuit, a disc substrate refrigeration unit by which said disc substrate was removed at the 2nd point is moved to the 1st point, and the disc substrate cooling system according to claim 14 which carries and carries out repeated use of another disc substrate is provided. Thus, by carrying out repeated use of the attachment component, it becomes possible to cool many disc substrates continuously one by one, and it can link directly with a molding apparatus in a disk manufacturing method, and can use.

[0022]In an invention concerning this invention Claim 16 for solving an aforementioned problem, the disc substrate cooling system according to claim 15 with which said disc substrate refrigeration unit more than plurality is installed in said moving road so that 1 directional movement is possible is provided. Disk number of sheets per time which can be processed can be made to increase by installing two or more above attachment components in a moving path.

[0023]In an invention concerning [ in order to solve an aforementioned problem ] this invention

Claim 17, The disc substrate cooling system according to any one of claims 14 to 16, wherein a contact electrode for an electromotive fan being formed in one with said attachment component as said suction means, and supplying electric power to said fan at said moving road is provided is provided.

[0024]By considering it as a cooling system of this composition, also while moving a moving road, holding power of a board-shaped object object in an attachment component can be kept stable. Electric power can be easily supplied to a fan which is moving with an attachment component.

[0025]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 18, A disc substrate molding means to be a manufacturing installation which produces a lamination disk continuously, to fill up a metallic mold with a fused plastic, and to mold said disc substrate of two sheets which should be pasted together, A cooling method which cools a disc substrate of two sheets immediately after said molding as said disc substrate using said cooling system according to any one of claims 14 to 17, A disk manufacturing installation having visible light reflection film means forming which forms a visible light reflecting layer in at least one disc substrate, and a lamination means which pastes said disc substrate of two sheets together via adhesives, and is used as a disk of one sheet among said two-sheet disc substrates is provided.

[0026]Although the state where there is neither a crack nor foreign matter adhesion in a disk surface is required very severely when manufacturing a disk, Since according to the disk manufacturing installation of this composition a disc substrate is held planate by a wind pressure in the flat-surface supporting structure as it is forced on an attachment component, Damage to a crack, foreign matter adhesion, etc. is prevented from arising on the surface of a disc substrate, and it can manufacture a disk excellent in surface accuracy which can meet the above-mentioned demand.

[0027]

[Embodiment of the Invention]Manufacture of DVD is made into an example and the embodiment concerning this invention is described.

The outline lineblock diagram of the DVD manufacturing installation which uses this invention is shown in <whole outline structure> drawing 1. In a figure, a disc substrate cooling system for the numerals S1 and S2 to cool a disc substrate molding apparatus, and for R cool a disc substrate and B are the disk manufacturing installations which built in the sputter device.

[0028]Inside the <structure of disc substrate molding apparatus> briquetting machines S1 and S2, A metallic mold is filled up with the plastic fused, respectively in an instant, and molding of the disc substrate is made by while becoming the Information Storage Division layer of a disc substrate, and making a field transfer the detailed pit (hole) and groove (slot) of La Stampa which were beforehand set to the metallic mold with sufficient accuracy. The disc substrates

1a and 1b molded, respectively are discharged by the next process from each position shown in drawing 1.

[0029]The disc substrate cooling system R of <structure of disc substrate cooling system> drawing 1 is provided with the following.

About the figure seen from just beside [ the ], as shown in drawing 3, they are the three-fold circumference ways 41, 42, and 43.

The 1st lifting device 44 that goes up and down between the circumference way 41 of the upper row, and the circumference way 42 of the middle.

The 2nd lifting device 45 that goes up and down between the circumference way 42 of the middle, and the circumference way 43 of the lower berth.

The 3rd lifting device 46 that goes up and down between the circumference way 41 of the upper row, and the circumference way 43 of the lower berth.

Two or more sets of the disc substrate refrigeration units 48 are installed in each circumference ways 41, 42, and 43 so that a run is possible. It carries out wind cooling by inhaling with the fan formed in the inside, the disc substrate refrigeration unit 48 attracting the disc substrate after molding on a flat attachment component, and holding it planate. These disc substrate refrigeration unit 48 carries the disc substrate after molding, goes each circumference way around in order of the upper row, the middle, and the lower berth, and returns to the circumference way 41 of the upper row again eventually.

[0030](a) of <structure of disc substrate refrigeration unit> drawing 2 is the top view which looked at the disc substrate refrigeration unit 48 from the upper part, and (b) is a side view.

The wheel 50 is being fixed by the bottom of the case 49 in which the disc substrate refrigeration unit 48 has an opening on the bottom and the upper surface, and the electromotive fan 51 is built in the inside of the case 49. The plate-like attachment component 54 which has the 1st breakthrough 52 and 2nd breakthrough 53 is attached to the upper surface of the case 49. The central hole H1 of a disc substrate and the projection 55 which fits in are formed in the center of the attachment component 54.

[0031]On said circumference ways 41, 42, and 43, two tracks which are not illustrated so that the disc substrate refrigeration unit 48 can run a prescribed position are provided, and the wheel 50 constitutes the track top so that a run is possible.

[0032]Said two tracks do not illustrate, and the wheel 50 serve also as the contact process electrode for carrying out an electric power supply from direct-current-power \*\*\*\*\* of 24V which is not illustrated to the electromotive fan 51. It is installed so that a run is possible, so that such two or more basic refrigeration units 48 may carry out round use on a circumference way, The disc substrate 1a (1b) is discharged by turns from the briquetting machines S1 and S2, and it is supplied to the disc substrate cooling system R, and is sent out one by one along said circumference way by the transportation device which the disc substrate refrigeration unit

48 in which this disc substrate was set does not illustrate.

[0033]While the disc substrate refrigeration unit 48 is moving said direct-current-power feeding means which is not illustrated along said circumference way, an electric power supply is stopped, and an electric power supply is resumed after a stop. Although the manufacturing process of DVD using the manufacturing installation constituted in general as mentioned above is explained below, each is omitted about said briquetting machine S1 which does not have charge in the main point of this invention directly, S2, and structure and operation with said detailed laminating apparatus.

[0034]<Disc substrate briquetting machine operation> First inside the briquetting machines S1 and S2, The detailed pit (hole) and groove (slot) of La Stampa which filled up the metallic mold with the fused plastic in an instant, and were beforehand set to the metallic mold, . While becomes the Information Storage Division layer of a disc substrate, and molding of a disc substrate should do by making a field transfer with sufficient accuracy. The disc substrate 1a molded by the briquetting machine S1 and the disc substrate 1b molded by the briquetting machine S2 are transferred to the disc substrate refrigeration unit 48 which stands by in the carrying-in position P1 provided in the disc substrate cooling system R by turns by the transfer means 2, respectively.

[0035]The Information Storage Division layer may not be provided in the disc substrate produced with one of briquetting machines depending on the kind of DVD to manufacture. With the briquetting machine S1 and the briquetting machine S2, as for the disc substrate skin temperature immediately after molding, 100 °C or the high temperature state beyond it is maintained, and the shape of the disc substrate has not become settled yet.

[0036]The disc substrate 1a (1b) produced with the <disc substrate cooling-system operation> briquetting machine S1 (S2), A \*\*\*\* injection is carried out at a time by one sheet at the disc substrate refrigeration unit 48 which stands by in the feeding position P1 established in the disc substrate cooling system R which cools a disc substrate by the transfer means 2 from each carrying out position. The disc substrate refrigeration unit 48 which laid the disc substrate 1a (1b) goes half round the circumference way 41, and appears in the 1st lifting device 44 (position of P2 in drawing 1). The 1st lifting device 44 carries the flat-surface holding unit 48, and descends to the circumference way 42 of the middle. Shortly, the disc substrate refrigeration unit 48 which descended on the circumference way 42 of the middle makes the circumference way 42 an opposite direction 1 round, and appears in the 2nd lifting device 45 (position of P3 in drawing 1). The 2nd lifting device 45 carries the disc substrate refrigeration unit 48, and descends to the circumference way 43 of the lower berth. Shortly, the flat-surface holding unit 48 which descended on the circumference way 43 of the lower berth makes the circumference way 43 an opposite direction 1 round again, and appears in the 3rd lifting device 46. The 3rd lifting device 46 carries the disc substrate refrigeration unit 48, and goes up to the

circumference way 41 of the upper row.

[0037]From the feeding position P1 to the discharge position P4 in the disc substrate refrigeration unit 48, since an air current acts on the field of a rear surface simultaneously while the disc substrate 1a (1b) on the disc substrate refrigeration unit 48 had been held planate, cooling will be promoted moderately. The disc substrate 1a (1b) which finished cooling is removed from the disc substrate refrigeration unit 48 which arrived at the discharge position P4, and is discharged by the next process by the transfer means 4. As for the length of said circumference ways 41, 42, and 43, or the number of disc substrate refrigeration units, it is preferred cooling condition \*\*\*\*\* of environmental temperature conditions or the substrate molded and to be adjusted suitably.

[0038]The disc substrate 1a (1b) laid and moved to the disc substrate refrigeration unit 48 is supplied to the feeding position P5 of disk laminating apparatus B which builds in the sputter device used as a next process by the transfer means 4 in 41Pupper row circumference way 4 position.

[0039]A sputter device is a device for providing the thin film (laser beam reflecting layer) which uses AL, Au, Ag, etc. as the main ingredients in the field side of said disc substrate in which the Information Storage Division layer is provided at least, and it is preferred that all use the device of publicly known common use. As a method (device) which disk lamination adopts, The method (device) of using thermosetting resin (hot melt) as adhesives, the method (device) of using an ultraviolet curing nature resin composition, or the method (device) of adopting a double-sided adhesion sheet of all using the method (device) of publicly known common use is preferred.

[0040]In the disk manufacturing installation constituted as mentioned above. It becomes possible to carry out continuously even molding of a disc substrate, cooling, weld slag, and lamination, and in the above-mentioned cooling process, since a chilling effect is promoted by making an air current act, if compared with the case of natural air cooling, it will become possible to shorten or miniaturize a process. moreover -- since it is cooled holding the disc substrate which is immediately after molding and whose shape is not yet stable planate in an operation of an air current -- shape -- it becomes possible to obtain a stable disc substrate efficient. The lamination disk (DVD) obtained by pasting such a disc substrate together also turns into a quality disk which was excellent in surface smoothness.

[0041]

[Effect of the Invention]The surface is planate when cooling the plastic disk substrate immediately after molding according to this invention, as explained above, Where said disc substrate is carried on the surface of the attachment component which has a breakthrough penetrated at the rear face from this surface, inhalation of air is performed from the rear-face side of said attachment component, and the air current which flows into the rear-face side from

the surface side of this attachment component is generated. for this reason, the shape where it became possible since cooling promotion can be carried out, carrying out flat-surface maintenance of said disc substrate on the surface of said attachment component to shorten a cooling process, and surface smoothness was excellent -- a stable disc substrate is efficient and is obtained.

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[Translation done.]

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TECHNICAL FIELD

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[Field of the Invention]Especially this invention relates to the suitable lamination method for manufacture of the digital video / versatile disk (it is hereafter written as DVD) which takes a lamination method about lamination \*\*\*\*\* in two members, for example, a disk.

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PRIOR ART

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[Description of the Prior Art]In DVD which is an information light disk, it is manufactured through the molding process of a disc substrate, the weld slag process of forming a visible light reflection film, a lamination process, etc. Said molding process is for while becoming the Information Storage Division layer of a disc substrate, and making a field transfer the detailed pit (hole) and groove (slot) of La Stampa which filled up the metallic mold with the fused plastic in an instant, and were beforehand set to the metallic mold with sufficient accuracy. Optical uniformity, such as submicron transfer nature and a double reflex, mechanical surface smoothness, etc. are raised to the accuracy for which the molded disc substrate is asked. When completing molding, maintaining such performances and transmitting promptly after a next process realizes an efficient manufacturing process, it is indispensable.

[0003]On the other hand, in said molding process, since the plastic (generally polycarbonate) by which heat melting was carried out to hundreds of times is used, by the disc substrate soon after after molding, the shape of a dovetail shape does not become settled easily in a high temperature state with the remarkable surface. It is also known that the disc substrate immediately after molding will cause vertical motion by the cooling process. In the disc substrate in which cooling was completed through such substrate movement, and shape became settled, instability remained in the surface smoothness. As for the disc substrate used for DVD, since thickness had only a half compared with 0.6 mm and the conventional CD, especially the tendency became strong. In the case where the shape of a disc substrate is not flat, information reliability may have been spoiled, after pasting such two disc substrates together.

[0004]In order to make it cool gradually, spending further again the grade time which is room temperature environment in order to keep distortion from remaining by said cooling process, between the weld slag processes which are next processes, the cooling process which has a buffer of prescribed capacity needed to be established.

[0005]On the other hand, from disc substrate molding to lamination disk completion can be carried out stably, and the demand about realization of an in-line device smaller than that of an installation face product is increasing in recent years.

[0006]

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EFFECT OF THE INVENTION

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[Effect of the Invention]The surface is planate when cooling the plastic disk substrate immediately after molding according to this invention, as explained above, Where said disc substrate is carried on the surface of the attachment component which has a breakthrough penetrated at the rear face from this surface, inhalation of air is performed from the rear-face side of said attachment component, and the air current which flows into the rear-face side from the surface side of this attachment component is generated. for this reason, the shape where it became possible since cooling promotion can be carried out, carrying out flat-surface maintenance of said disc substrate on the surface of said attachment component to shorten a cooling process, and surface smoothness was excellent -- a stable disc substrate is efficient and is obtained.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention]This invention is made in view of the above-mentioned situation, and is a thing.

the purpose cools more the disc substrate immediately after molding by a briquetting machine to the inside of a short time, and it is excellent in surface smoothness -- shape -- it is providing the high inline-type disk manufacturing method of the yield for manufacturing a lamination disk (DVD) by considering it as a stable thing.

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**MEANS**

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[Means for Solving the Problem]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 1, Are the method of cooling a plastic disk substrate immediately after molding, and the surface is planate, Where said disc substrate is carried on the surface of an attachment component which has a breakthrough penetrated at the rear face from this surface, A cooling method of a disc substrate cooling carrying out flat-surface maintenance of said disc substrate on the surface of said attachment component is provided by performing inhalation of air from the rear-face side of said attachment component, and generating an air current which flows into the rear-face side from the surface side of this attachment component. Generally, if skin temperature of a disc substrate immediately after molding is measured against a room temperature, shape will not become settled quite highly, either. Then, after laying said disc substrate in said attachment component, power in which the whole disc substrate surface is suppressed soft without contact by the side of the surface uniform moreover from the surface to said attachment component by making an air current which flows into a rear face act is used. Flat-surface maintenance is attained by it, and a flow of an air current also brings about a moderate cooling facilitatory effect. A flat thing of a mounting surface of said attachment component is desirable in accuracy according to the purpose, and, as for speed of an air current made to act, it is preferred to be suitably adjusted according to the rigidity of said disc substrate.

[0008]In order to solve an aforementioned problem, in an invention concerning this invention Claim 2, a cooling method of the disc substrate according to claim 1 generating said air current is provided in both inner periphery edges and outer periphery parts of a disc substrate at least. Said air current is making it generate over a whole inner periphery edge and an outer periphery part of a disc substrate, respectively rather than making it act on an inner periphery edge of a disc substrate, or a part of outer periphery part locally, There is no bias over the whole disc substrate surface, and it is made more desirable [ to generate uniformly power

which forces a disc substrate on an attachment component ].

[0009]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 3, Said disc substrate is made to hold on the surface of said attachment component at the 1st point, After moving this attachment component by a moving road and performing shape stabilization by cooling in the meantime, Claim 1 removing said disc substrate from on said attachment component at the 2nd point or either of 2 is provided with a cooling method of a disc substrate of a description. Thus, if it has composition which removes said disc substrate from on said attachment component at the 2nd point after making said disc substrate hold on the surface of said attachment component at the 1st point and moving this attachment component by a moving road, it can apply to a continuous process and can contribute to improvement in productivity. Since only predetermined time can hold a disc substrate plane if only predetermined length moves an attachment component at a predetermined speed, it becomes possible to attain automation of a process.

[0010]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 4, Said attachment component which had said disc substrate removed at the 2nd point of said cooling method is again moved to the 1st point, and a cooling method of the disc substrate according to claim 3 which carries and carries out repeated use of another disc substrate is provided. Thus, by carrying out repeated use of the attachment component, it becomes possible to cool many disc substrates continuously one by one, and it can link directly with a molding process in a disk manufacturing method, and can use. In an invention concerning this invention Claim 5 for solving an aforementioned problem, said two or more attachment components provide a moving road with a cooling method of the disc substrate according to claim 4 currently installed so that 1 directional movement is possible. Disk number of sheets per time which can be processed can be made to increase by installing two or more above attachment components in a moving path.

[0011]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 6, While forming this attachment component and a fan of an electromotive type in one in the rear-face side of said attachment component, A contact electrode for supplying electric power to said fan is provided in said moving road, and a cooling method of the disc substrate according to claim 4 generating said air current is provided by rotating said fan. According to this method, also while moving a moving road, holding power of a board-shaped object object in an attachment component can be kept stable. Although it is difficult to perform wiring for supplying electric power to a fan which moves a moving road with an attachment component, if a contact electrode is provided in a moving road, electric power can be easily supplied to a fan under movement.

[0012]In order to solve an aforementioned problem, in an invention concerning this invention Claim 7, a cooling method of the disc substrate according to claim 6 supplying direct current

voltage to said fan intermittently in said moving road is provided. In a moving road, when supplying electric power to a fan via a contact electrode, it is preferred to supply direct current voltage intermittently. Since the direct current can operate on low voltage, electric power supplied to a fan has high safety. Since it will be easy to exhaust an electrode if an electric power supply using a contact electrode is performed, consumption of an electrode can be suppressed by supplying electric power intermittently. Although intermittently stopped by electric power supply to a fan, since it can continue being turned around a fan according to an inertia force also while an electric power supply has stopped, holding power of a board-shaped object and cooling in an attachment component are maintainable by setting up stop time of an electric power supply suitably. In order to solve an aforementioned problem, in an invention concerning this invention Claim 8, said attachment component in said moving road is moved intermittently, and a cooling method of the disc substrate according to claim 7 supplying direct current voltage to said fan is provided at the time of a stop of said attachment component. When supplying electric power to a fan intermittently, an attachment component in a moving road is moved intermittently, and it is preferred at the time of a stop of an attachment component to supply direct current voltage to a fan.

[0013]At the time of a stop of an attachment component, by supplying electric power to a fan via a contact electrode, In an invention concerning [ in order to solve an aforementioned problem which can suppress consumption of an electrode effectively ] this invention Claim 9, By filling up a metallic mold with a plastic which is a manufacturing method manufactured continuously and fused a lamination disk, A disc substrate molding process of molding said disc substrate of two sheets which should be pasted together, A cooling process which cools a disc substrate of two sheets immediately after said molding using said cooling method according to any one of claims 1 to 8, A disk manufacturing method having a weld slag process of forming a visible light reflecting layer in at least one disc substrate, and a lamination process which pastes said disc substrate of two sheets together via adhesives, and is used as a disk of one sheet among said disc substrates of two sheets is provided.

[0014]In order to solve an aforementioned problem, in an invention concerning this invention Claim 10, the disk manufacturing method according to claim 9, wherein said disk is DVD is provided. Although the state where there is neither a crack nor foreign matter adhesion in a disk surface is required very severely when manufacturing disks, such as DVD, Since damage to a crack, foreign matter adhesion, etc. can be prevented from arising on the surface of a disc substrate if a disc substrate is forced on an attachment component by a wind pressure as mentioned above and it holds planate, a disk excellent in surface accuracy which can meet the above-mentioned demand can be manufactured.

[0015]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 11, Where it had an attachment component which has a breakthrough which the surface

is planate and penetrates at the rear face from this surface, and a suction means provided in the rear-face side of said attachment component and a disc substrate is carried on the surface of said attachment component, While inhaling by said suction means and holding a disc substrate immediately after said shaping on the surface of said attachment component, a disc substrate refrigeration unit cooling said disc substrate is provided. According to this disc substrate refrigeration unit, an air current which flows into the rear-face side from the surface side of an attachment component can be generated by a suction means by performing inhalation of air from the rear-face side of an attachment component. Therefore, it is a wind pressure by this air current, and a thing which holds it as force a disc substrate on an attachment component and for which soft power is made to act and a disc substrate is held planate without contacting an object to the surface side of a disc substrate since things can be carried out is possible. Therefore, a disc substrate can be held planate correctly, without doing damage to a crack, foreign matter adhesion, etc. to the surface.

[0016]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 12, While having the 1st larger breakthrough than a feed hole of said disc substrate on the surface, said attachment component, When said disc substrate is carried on said attachment component so that said 1st breakthrough and a center may be in agreement, . [ whether at least a part of periphery edge of said disc substrate is located in a method of outside / edge / of said attachment component /, and ] Or the disc substrate refrigeration unit according to claim 11 characterized by a thing of whether a breakthrough is provided in a position which laps with a periphery edge of this disc substrate for which it has one of shape at least is provided.

[0017]When according to the cooling system of this composition the center of a disc substrate arranges so that it may be in agreement with the center of the 1st breakthrough of the above, Since a wind pressure can be made to be able to act on both inner periphery edges and outer periphery parts of a disc substrate, a disc substrate can set radially power which forces a disc substrate on the surface of an attachment component and it can equalize more, it is desirable when preventing bending and curvature from arising in a disc substrate. A flow of an air current from the disk rear-face side to the surface side can be made good over both an inner periphery edge and an outer periphery part by specifying relation between a feed hole of a disc substrate, or a periphery edge and a breakthrough, or physical relationship of the edge of a disk and an attachment component as mentioned above.

[0018]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 13, A path of said 1st breakthrough is larger than 15 mm, a center is the same as said 1st breakthrough, and the 2nd breakthrough is provided on a circle whose path is 80 mm, And. [ whether the edge of said attachment component is located in an inner direction from a circle whose path a center is the same as said 1st breakthrough, and is 120 mm, and ] Or the disc



substrate refrigeration unit according to claim 12 characterized by a thing of whether the 3rd breakthrough is provided on a circle in which said path is 120 mm for which it has one of shape at least is provided.

[0019]Are applicable to both an outer diameter [ of 80 mm ] type disc substrate, and an outer diameter [ of 120 mm ] type disc substrate, and even if a tabular member is which disc substrate, a wind pressure can be made to act on both the inner periphery edge and outer periphery part, if it is considered as a cooling system of this composition.

[0020]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 14, In a moving path where the disc substrate refrigeration unit according to any one of claims 11 to 13 moves, and the 1st point of said moving road, In a means to carry said disc substrate on the surface of said attachment component of said disc substrate refrigeration unit, and the 2nd point of said moving road, A disc substrate cooling system provided with a means which removes said disc substrate from said attachment component of said disc substrate refrigeration unit is provided.

[0021]By considering it as a cooling system of this composition, it can apply to a continuous process and can contribute to improvement in productivity. It is also possible to attain automation of a process. In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 15, Said moving path is making a circuit, a disc substrate refrigeration unit by which said disc substrate was removed at the 2nd point is moved to the 1st point, and the disc substrate cooling system according to claim 14 which carries and carries out repeated use of another disc substrate is provided. Thus, by carrying out repeated use of the attachment component, it becomes possible to cool many disc substrates continuously one by one, and it can link directly with a molding apparatus in a disk manufacturing method, and can use.

[0022]In an invention concerning this invention Claim 16 for solving an aforementioned problem, the disc substrate cooling system according to claim 15 with which said disc substrate refrigeration unit more than plurality is installed in said moving road so that 1 directional movement is possible is provided. Disk number of sheets per time which can be processed can be made to increase by installing two or more above attachment components in a moving path.

[0023]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 17, The disc substrate cooling system according to any one of claims 14 to 16, wherein a contact electrode for an electromotive fan being formed in one with said attachment component as said suction means, and supplying electric power to said fan at said moving road is provided is provided.

[0024]By considering it as a cooling system of this composition, also while moving a moving road, holding power of a board-shaped object object in an attachment component can be kept

stable. Electric power can be easily supplied to a fan which is moving with an attachment component.

[0025]In an invention concerning [ in order to solve an aforementioned problem ] this invention Claim 18, A disc substrate molding means to be a manufacturing installation which produces a lamination disk continuously, to fill up a metallic mold with a fused plastic, and to mold said disc substrate of two sheets which should be pasted together, A cooling method which cools a disc substrate of two sheets immediately after said molding as said disc substrate using said cooling system according to any one of claims 14 to 17, A disk manufacturing installation having visible light reflection film means forming which forms a visible light reflecting layer in at least one disc substrate, and a lamination means which pastes said disc substrate of two sheets together via adhesives, and is used as a disk of one sheet among said two-sheet disc substrates is provided.

[0026]Although the state where there is neither a crack nor foreign matter adhesion in a disk surface is required very severely when manufacturing a disk, Since according to the disk manufacturing installation of this composition a disc substrate is held planate by a wind pressure in the flat-surface supporting structure as it is forced on an attachment component, Damage to a crack, foreign matter adhesion, etc. is prevented from arising on the surface of a disc substrate, and it can manufacture a disk excellent in surface accuracy which can meet the above-mentioned demand.

[0027]

[Embodiment of the Invention]Manufacture of DVD is made into an example and the embodiment concerning this invention is described.

The outline lineblock diagram of the DVD manufacturing installation which uses this invention is shown in <whole outline structure> drawing 1. In a figure, a disc substrate cooling system for the numerals S1 and S2 to cool a disc substrate molding apparatus, and for R cool a disc substrate and B are the disk manufacturing installations which built in the sputter device.

[0028]Inside the <structure of disc substrate molding apparatus> briquetting machines S1 and S2, A metallic mold is filled up with the plastic fused, respectively in an instant, and molding of the disc substrate is made by while becoming the Information Storage Division layer of a disc substrate, and making a field transfer the detailed pit (hole) and groove (slot) of La Stampa which were beforehand set to the metallic mold with sufficient accuracy. The disc substrates 1a and 1b molded, respectively are discharged by the next process from each position shown in drawing 1.

[0029]The disc substrate cooling system R of <structure of disc substrate cooling system> drawing 1 is provided with the following.

About the figure seen from just beside [ the ], as shown in drawing 3, they are the three-fold circumference ways 41, 42, and 43.

The 1st lifting device 44 that goes up and down between the circumference way 41 of the upper row, and the circumference way 42 of the middle.

The 2nd lifting device 45 that goes up and down between the circumference way 42 of the middle, and the circumference way 43 of the lower berth.

The 3rd lifting device 46 that goes up and down between the circumference way 41 of the upper row, and the circumference way 43 of the lower berth.

Two or more sets of the disc substrate refrigeration units 48 are installed in each circumference ways 41, 42, and 43 so that a run is possible. It carries out wind cooling by inhaling with the fan formed in the inside, the disc substrate refrigeration unit 48 attracting the disc substrate after molding on a flat attachment component, and holding it planate. These disc substrate refrigeration unit 48 carries the disc substrate after molding, goes each circumference way around in order of the upper row, the middle, and the lower berth, and returns to the circumference way 41 of the upper row again eventually.

[0030](a) of <structure of disc substrate refrigeration unit> drawing 2 is the top view which looked at the disc substrate refrigeration unit 48 from the upper part, and (b) is a side view. The wheel 50 is being fixed by the bottom of the case 49 in which the disc substrate refrigeration unit 48 has an opening on the bottom and the upper surface, and the electromotive fan 51 is built in the inside of the case 49. The plate-like attachment component 54 which has the 1st breakthrough 52 and 2nd breakthrough 53 is attached to the upper surface of the case 49. The central hole H1 of a disc substrate and the projection 55 which fits in are formed in the center of the attachment component 54.

[0031]On said circumference ways 41, 42, and 43, two tracks which are not illustrated so that the disc substrate refrigeration unit 48 can run a prescribed position are provided, and the wheel 50 constitutes the track top so that a run is possible.

[0032]Said two tracks do not illustrate, and the wheel 50 serve also as the contact process electrode for carrying out an electric power supply from direct-current-power \*\*\*\*\* of 24V which is not illustrated to the electromotive fan 51. It is installed so that a run is possible, so that such two or more basic refrigeration units 48 may carry out round use on a circumference way, The disc substrate 1a (1b) is discharged by turns from the briquetting machines S1 and S2, and it is supplied to the disc substrate cooling system R, and is sent out one by one along said circumference way by the transportation device which the disc substrate refrigeration unit 48 in which this disc substrate was set does not illustrate.

[0033]While the disc substrate refrigeration unit 48 is moving said direct-current-power feeding means which is not illustrated along said circumference way, an electric power supply is stopped, and an electric power supply is resumed after a stop. Although the manufacturing process of DVD using the manufacturing installation constituted in general as mentioned above is explained below, each is omitted about said briquetting machine S1 which does not

have charge in the main point of this invention directly, S2, and structure and operation with said detailed laminating apparatus.

[0034]<Disc substrate briquetting machine operation> First inside the briquetting machines S1 and S2, The detailed pit (hole) and groove (slot) of La Stampa which filled up the metallic mold with the fused plastic in an instant, and were beforehand set to the metallic mold, . While becomes the Information Storage Division layer of a disc substrate, and molding of a disc substrate should do by making a field transfer with sufficient accuracy. The disc substrate 1a molded by the briquetting machine S1 and the disc substrate 1b molded by the briquetting machine S2 are transferred to the disc substrate refrigeration unit 48 which stands by in the carrying-in position P1 provided in the disc substrate cooling system R by turns by the transfer means 2, respectively.

[0035]The Information Storage Division layer may not be provided in the disc substrate produced with one of briquetting machines depending on the kind of DVD to manufacture. With the briquetting machine S1 and the briquetting machine S2, as for the disc substrate skin temperature immediately after molding, 100 °C or the high temperature state beyond it is maintained, and the shape of the disc substrate has not become settled yet.

[0036]The disc substrate 1a (1b) produced with the <disc substrate cooling-system operation> briquetting machine S1 (S2), A \*\*\*\* injection is carried out at a time by one sheet at the disc substrate refrigeration unit 48 which stands by in the feeding position P1 established in the disc substrate cooling system R which cools a disc substrate by the transfer means 2 from each carrying out position. The disc substrate refrigeration unit 48 which laid the disc substrate 1a (1b) goes half round the circumference way 41, and appears in the 1st lifting device 44 (position of P2 in drawing 1). The 1st lifting device 44 carries the flat-surface holding unit 48, and descends to the circumference way 42 of the middle. Shortly, the disc substrate refrigeration unit 48 which descended on the circumference way 42 of the middle makes the circumference way 42 an opposite direction 1 round, and appears in the 2nd lifting device 45 (position of P3 in drawing 1). The 2nd lifting device 45 carries the disc substrate refrigeration unit 48, and descends to the circumference way 43 of the lower berth. Shortly, the flat-surface holding unit 48 which descended on the circumference way 43 of the lower berth makes the circumference way 43 an opposite direction 1 round again, and appears in the 3rd lifting device 46. The 3rd lifting device 46 carries the disc substrate refrigeration unit 48, and goes up to the circumference way 41 of the upper row.

[0037]From the feeding position P1 to the discharge position P4 in the disc substrate refrigeration unit 48, since an air current acts on the field of a rear surface simultaneously while the disc substrate 1a (1b) on the disc substrate refrigeration unit 48 had been held planate, cooling will be promoted moderately. The disc substrate 1a (1b) which finished cooling is removed from the disc substrate refrigeration unit 48 which arrived at the discharge position

P4, and is discharged by the next process by the transfer means 4. As for the length of said circumference ways 41, 42, and 43, or the number of disc substrate refrigeration units, it is preferred cooling condition \*\*\*\*\* of environmental temperature conditions or the substrate molded and to be adjusted suitably.

[0038]The disc substrate 1a (1b) laid and moved to the disc substrate refrigeration unit 48 is supplied to the feeding position P5 of disk laminating apparatus B which builds in the sputter device used as a next process by the transfer means 4 in 41Pupper row circumference way 4 position.

[0039]A sputter device is a device for providing the thin film (laser beam reflecting layer) which uses AL, Au, Ag, etc. as the main ingredients in the field side of said disc substrate in which the Information Storage Division layer is provided at least, and it is preferred that all use the device of publicly known common use. As a method (device) which disk lamination adopts, The method (device) of using thermosetting resin (hot melt) as adhesives, the method (device) of using an ultraviolet curing nature resin composition, or the method (device) of adopting a double-sided adhesion sheet of all using the method (device) of publicly known common use is preferred.

[0040]In the disk manufacturing installation constituted as mentioned above. It becomes possible to carry out continuously even molding of a disc substrate, cooling, weld slag, and lamination, and in the above-mentioned cooling process, since a chilling effect is promoted by making an air current act, if compared with the case of natural air cooling, it will become possible to shorten or miniaturize a process. moreover -- since it is cooled holding the disc substrate which is immediately after molding and whose shape is not yet stable planate in an operation of an air current -- shape -- it becomes possible to obtain a stable disc substrate efficient. The lamination disk (DVD) obtained by pasting such a disc substrate together also turns into a quality disk which was excellent in surface smoothness.

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[Translation done.]

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DESCRIPTION OF DRAWINGS

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[Brief Description of the Drawings]

[Drawing 1]It is a figure showing the embodiment concerning this invention, and is a top view showing the outline lineblock diagram of a disk manufacturing installation.

[Drawing 2]It is the top view and side view showing the outline composition of a disc substrate refrigeration unit.

[Drawing 3]It is a side view showing the outline composition of the cooling system which cools a disc substrate.

[Description of Notations]

S1 disc-substrate molding apparatus (disc substrate means forming)

S2 disc-substrate molding apparatus (disc substrate means forming)

R Cooling system (disc substrate cooling method)

B disk laminating apparatus (lamination means of a two-sheet disc substrate)

2 Disc substrate transfer means (briquetting machine -> cooling system)

1a Disc substrate

1b Disc substrate

4 Disc substrate transfer means (cooling-system -> disk laminating apparatus)

41-43 Circumference way

44 The 1st lifting device

45 The 2nd lifting device

46 The 3rd lifting device

48 Disc substrate refrigeration unit

51 Fan

52 The 1st breakthrough

53 The 2nd breakthrough

54 Attachment component

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[Translation done.]

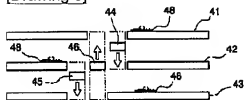
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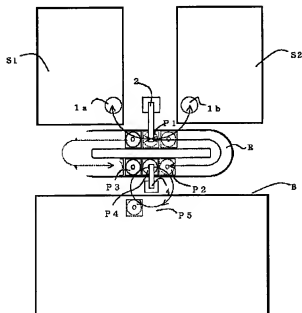
## DRAWINGS

[Drawing 3]



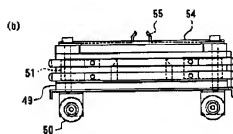
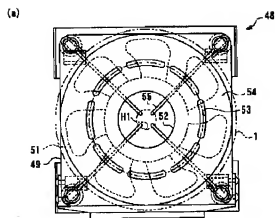
[Drawing 1]

[図面 1]



[Drawing 2]





[Translation done.]